

WHAT IS CLAIMED IS:

1. A purge device for actively purging a pellicle volume enclosed within a reticle-pellicle assembly, the reticle-pellicle assembly having a reticle, a pellicle, and a gas permeable pellicle frame, the gas permeable pellicle frame supporting the pellicle at a standoff from the reticle, the purge device comprising:

a base having a purge input interface and a cavity,

wherein said cavity receives at least a portion of the reticle-pellicle assembly including a pellicle and the enclosed pellicle volume such that a first region within the cavity is formed at the purge input interface, a second region within the cavity is formed at a permeable side of the pellicle frame away from the first region, and a gap region is formed between the pellicle and a surface of the cavity, and purging gas sent through the purge input interface is kept at a higher pressure in the first region relative to the second region such that the purging gas flows through the enclosed pellicle volume and said gap region, whereby, a displacement force on the pellicle due to a pressure difference between purging gas in the enclosed volume and purging gas in the gap region is within a tolerance range of the pellicle.

2. The device of claim 1, wherein said base includes at least one support member that supports the reticle-pellicle assembly.

3. The device of claim 1, wherein said base includes at least one holding member that holds the reticle-pellicle assembly onto the base.

4. The device of claim 3, wherein said holding member comprises a vacuum groove.

5. The device of claim 1, wherein the pellicle frame is permeable to gas and impermeable to particles.

6. The device of claim 5, wherein the pellicle frame includes at least two sides permeable to gas arranged within said cavity such that at least one permeable side faces the first region and another permeable side faces the second region.
7. The device of claim 5, wherein the pellicle frame comprises:
  - a first pair of opposing sides permeable to gas and arranged within said cavity such that one permeable side of said first pair faces the first region and the other permeable side of said first pair faces the second region; and
  - a second pair of opposing sides impermeable to gas and arranged within said cavity such that one permeable side of said second pair faces a first cavity wall between the first region and the second region and the other permeable side of said second pair faces a second cavity wall between the first region and the second region opposite said first cavity wall.
8. The device of claim 5, wherein the purging gas includes nitrogen and the pellicle frame is permeable to nitrogen.
9. The device of claim 1, wherein said purge input interface includes at least one port for passing the purging gas to the first region.
10. The device of claim 1, further comprising a purge output interface having at least one port for passing exhaust out of the purge device.
11. The device of claim 1, wherein the cavity comprises a rectangular volume within said base.
12. The device of claim 1, wherein the first region is substantially enclosed by a permeable side of the pellicle frame, the purge input interface, a surface of the reticle, a top surface of the base, and side walls of the cavity.

13. The device of claim 1, further comprising a flow barrier that keeps the flow of the purging gas within the first region before entering the pellicle volume.

14. The device of claim 13, wherein said flow barrier comprises a non-contacting gas barrier.

15. The device of claim 14, wherein said non-contacting gas barrier comprises two groups of jets that direct additional purging gas toward opposite sides of the first region.

16. The device of claim 14, wherein said non-contacting gas barrier comprises two groups of jets that direct additional purging gas upon opposite sides of the first region and another group of jets that direct additional purging gas against the flow going through the gap region under the pellicle.

17. The device of claim 14, wherein said non-contacting gas barrier further includes several gas chambers and groups of jets that direct additional purging gas at different velocities.

18. The device of claim 13, wherein said flow barrier comprises a contacting barrier.

19. The device of claim 18, wherein said contacting barrier comprises two fingers that pivot between a closed and open position, wherein the flow of the purging gas is kept within the first region before entering the pellicle volume when said fingers are in the closed position.

20. The device of claim 19, wherein said base includes two recesses for receiving said two fingers when said fingers are in the open position.

21. The device of claim 18, wherein said contact barrier comprises two seals that move between a closed and open position, wherein the flow of the purging gas is kept within the first region before entering the pellicle volume when said seals are in the closed position.

22. The device of claim 21, wherein said base includes two recesses for receiving said two seals when said seals are in the open position.

23. The device of claim 13, further comprising another flow barrier that keeps the flow of the purging gas within the second region as it exits the pellicle volume.

24. The device of claim 1, further comprising:  
at least one plate within the cavity of said base and extending parallel with the pellicle such that said gap region is formed between a surface of said at least one plate and said pellicle.

25. The device of claim 24, wherein said at least one plate includes a pressure balancing plate having a set of holes.

26. The device of claim 25, wherein said base includes one or more dividing walls that extend within said cavity to form a first plenum below said set of holes in said pressure balancing plate.

27. The device of claim 26, wherein said at least one plate further includes a first flow resistant plate arranged along a front of the gap region at or near said first region; and a second flow resistant plate arranged along a back of the gap region at or near said second region.

28. The device of claim 26, wherein said one or more dividing walls further extend within said cavity to form second and third plenums below said first and second flow resistant plates respectively, whereby, pressure of a

purging gas in the second and third plenums can be controlled to provide a flow resistance within the gap region that tends to direct a purging gas flow from the purge input interface through the enclosed pellicle volume.

29. The device of claim 25, wherein said base includes one or more support members having an adjustable height that extend within said cavity to form a first plenum below said set of holes in said pressure balancing plate.

30. A purge device for actively purging a pellicle volume enclosed within a reticle-pellicle assembly, the reticle-pellicle assembly having a reticle, a pellicle, and a gas permeable pellicle frame, the gas permeable pellicle frame supporting the pellicle at a standoff from the reticle, the purge device comprising:

a base having a cavity formed therein, wherein said cavity receives at least a portion of the reticle-pellicle assembly including a pellicle and the enclosed pellicle volume such that a first region within the cavity is formed, said first region being capable of holding a purging gas at a high pressure; and

a flow barrier that keeps the flow of the purging gas within the first region at a high pressure as it enters the enclosed pellicle volume.

31. The device of claim 30, wherein said flow barrier comprises a non-contacting gas barrier.

32. The device of claim 31, wherein said non-contacting gas barrier comprises two groups of corner jets disposed within corners of said base that direct additional purging gas toward opposite sides of the first region.

33. The device of claim 32, wherein said non-contacting gas barrier further includes a third group of bottom jets disposed at a top surface of said base that direct additional purging gas against a flow of the purging gas traveling in a gap under the pellicle.